

Calorimetric study of isomeric and steric effects amine-alcohol interactions

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MS received 13 May 1983; revised 24 November 1983

Abstract. The enthalpy of complex formation between different isomers of butylamine and butylalcohol was determined at 30°C by obtaining the partial molar enthalpy of dissociation of 1:1 complexes in *n*-hexane. In both series *viz.* normal amine with isomeric alcohols and normal alcohol with isomeric amines, the enthalpy of complex formation showed the same trend as $t > n > iso > sec$.

The trend in normal-normal, normal-tertiary, tertiary-tertiary and secondary-secondary complexes was as $t - n > n - n > t - t > sec - sec$. Both these trends were explained in terms of steric and electromeric effects.

Keywords. Calorimetry; amine-alcohol interactions; isomeric effect; steric effect; enthalpy of complexes.

1. Introduction

Variation in physical properties depend on the position at which the alkyl chain is branched and the nature of the substituted group. Branching has two effects *viz* a steric effect which depends on the geometry of the substituted group and the isomeric effect (inductive +*I* or –*I* effect) which depends on the nature of the group. In the present investigation we have determined the enthalpies of complex formation between different isomers of butyl amine and butanols by dissociation method (Pradhan and Pathak 1980). The comparison of the calorimetric data thus obtained helps in understanding the effect of steric hindrance and induction on the molecular interactions between these compounds.

2. Experimental

The compounds used in the present investigation and the methods of their purification have already been given earlier (Pradhan and Mathur 1979). The heats of mixing were determined at 30°C by a calorimeter specially constructed for this purpose. The experimental details and the accuracy have been given earlier (Pradhan and Pathak 1980).

3. Results and discussion

Heats of mixing data for nine systems consisting of *n*-hexane with synthetically prepared 1:1 complexes of *n*-BuNH₂ + *n*-BuOH, *n*-BuNH₂ + iso-BuOH, *n*-BuNH₂ +

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